Problem Set 3

1. Circle the compounds in the table below that you would expect to exhibit aromatic character.
2. Cycloheptatrienone is stable, but cyclopentadienone is so reactive that it can't be isolated. Explain. [McMurray 15.32]
3. Calicene has an unusually large dipole for a hydrocarbon and a particularly low barrier to rotation about the double bond connecting the two rings. Explain. [McMurray 15.37]

![Calicene](image)

4. On reaction with acid, 4-pyrone is protonated to give a stable cationic product. Predict the structure of the product and using RESONANCE STRUCTURES and the Hückel $4n + 2$ rule, explain why the product you predicted is so stable.

![4-pyrone](image)

5. The following three organic iodides all undergo $S_N1$ reactions. However, the relative rates of these reactions is indicated. Suggest an explanation for this order of rates. (Hint: what is the intermediate in an $S_N1$ reaction?)

![Iodides](image)
6. The exocyclic carbon on the compound on the left exhibits electrophilic character (i.e. reacts with nucleophiles), while the exocyclic carbon on the compound on the right exhibits nucleophilic character (i.e. reacts with electrophiles). Provide a reasonable explanation for this reactivity using resonance forms as part of your answer.

![Resonance forms for electrophilic and nucleophilic reactivity]